The effects of epidural analgesia on labor, maternal and neonatal outcomes: a systematic review

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Authors' objectives
To determine whether epidural analgesia causes important side-effects.

Searching
A previously described literature search was expanded and updated to March 2001 (see Other Publications of Related Interest). Updated and original searches were carried out on MEDLINE, EMBASE and the Cochrane Library, using a list of search terms that were reported in the review. The original handsearch of the International Journal of Obstetric Anesthesia was updated from January 1998 to January 2001. The bibliographies of recent review articles and the authors' personal files were examined for relevant articles. Published abstracts from January 1998 to March 2001 of the following meetings were also included: the American Society of Anesthesiologists, the International Anesthesia Research Society, the Society for Obstetric Anesthesia and Perinatology, and the Society for Maternal-Fetal Medicine. In addition, the authors reviewed the abstracts of studies identified by the Maternity Center Association for inclusion.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) or, if no RCTs were available for a particular outcome, prospective cohort studies, were eligible for inclusion. Only cohort studies considered to be of a high quality and meeting the following criteria were eligible for inclusion: the relationship of the sample to the population was defined; the response rate for those asked to participate was at least 60%; there were at least 50 patients in the inception cohort; the assessment method was clearly described; and data on at least 90% of the inception cohort patients were analysed.

Specific interventions included in the review
Studies comparing epidural analgesia with parenteral opioids in labour were eligible for inclusion.

Participants included in the review
Studies of parturient women were eligible for inclusion. The participants in the included studies were all healthy women with uneventful pregnancies.

Outcomes assessed in the review
Studies in relation to the following outcomes were sought: maternal comfort, operative delivery (Caesarean or instrumented vaginal delivery), length of first-stage labour, length of second-stage labour, maternal temperature, neonatal cord pH, neonatal Apgar scores, long-term maternal back pain, breast-feeding success and urinary incontinence.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
Each peer-reviewed RCT was assessed for quality using the Jadad scale. Studies available only in abstract form were not rated for quality. The authors do not state how the quality assessment was performed.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data
Methods of synthesis
How were the studies combined?
Where appropriate, the results of RCTs were combined by meta-analysis using a random-effects model. The odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for dichotomous data using the method of DerSimonian and Laird. The random-effects weighted mean difference and 95% CIs were calculated for continuous data. Where no RCTs were available, prospective cohort studies were described but not statistically combined. For the outcome of Caesarean delivery, only intention-to-treat (ITT) data were analysed. For other outcomes, ITT data were analysed when available, otherwise data on protocol-compliant patients were analysed.

How were differences between studies investigated?
Heterogeneity was assessed using the chi-squared test.

Results of the review
A total of 16 studies (n=4,721) were included: 14 RCTs (n=4,324) and 2 prospective cohort studies (n=397).

The Jadad quality scores, where rated, ranged from 1 to 3 out of a possible 5 points.

Incidence of Caesarean delivery (11 RCTs): the incidence of Caesarean delivery for any indication did not differ between patients randomised to receive parenteral opioids and those randomised to receive epidural analgesia for labour pain relief (OR 1.00, 95% CI: 0.77, 1.28). Heterogeneity was not detected (p=0.34). Similarly, there was no difference in the incidence of Caesarean delivery for any indication if only high-quality studies (Jadad score 3) were considered.

Other maternal outcomes: mothers receiving epidural analgesia had lower pain scores (both first stage and second stage; 7 and 5 RCTs, respectively) and were more satisfied (6 RCTs) with their analgesia (all p<0.001). The total instrumented vaginal delivery rate (11 RCTs) was higher in the epidural group, but heterogeneity existed. Second-stage labour (8 RCTs) was longer in epidural group patients. The incidences of oxytocin initiation after analgesia (2 RCTs), fever (3 RCTs) and hypotension (3 RCTs) were higher in the epidural group. No statistically significant differences were found for the outcomes of instrumented vaginal delivery for dystocia, length of first-stage labour, nausea, or mid- or lower-back pain at 3 or 12 months.

Neonatal outcomes: the incidence of poor (less than 7) 1-minute Apgar scores (5 RCTs) and the need for neonatal naloxone (4 RCTs) were higher in the parenteral opioid group. No statistically significant differences were found for foetal heart rate abnormalities or intrapartum meconium, poor 5-minute Apgar scores, low umbilical artery pH or severe asphyxia. Heterogeneity was not detected in these studies.

Breast feeding success (1 prospective cohort study): the intrapartum analgesic method used did not affect lactation success at 6 weeks.

Urinary incontinence (1 prospective cohort study): this was more frequent among women who chose epidural analgesia in the immediate post-partum period, but not at 3 months or 1 year post-partum.

Authors' conclusions
Epidural analgesia provides a versatile method of administering effective and satisfactory relief to parturient women. The technique should not be considered as a single entity, because the type and dose of epidural medication can be altered as needed. Existing evidence suggests that women should not avoid epidural analgesia for fear of neonatal harm, breast-feeding difficulties, Caesarean delivery, long-term back pain or long-term urinary incontinence. Epidural analgesia may alter the dynamics of labour and maternal temperature regulation. These topics should be explored with appropriately designed, randomised and multidisciplinary studies.
The review question was clearly stated and was well supported by a priori defined inclusion and exclusion criteria. The literature search was adequate; however, it is unclear if there were any language or publication restrictions. It is possible, therefore, that relevant studies may have been omitted from the review. The quality of the included RCTs was assessed, but it was unclear whether this was assessed by more than one reviewer. Heterogeneity was investigated and the studies were appropriately synthesised using quantitative pooling; where this was inappropriate, a descriptive summary was used. The authors did not provide any information relating to the review process, i.e. how decisions were made on the relevance of primary studies, how judgements of validity were made, and how the data were extracted. Hence, it was not possible to determine how rigorous this process was and whether this may have introduced bias. The authors' conclusions follow on from the findings of the review.

**Implications of the review for practice and research**

Practice: The authors state that epidural analgesia provides a versatile method of administering effective and satisfactory relief to parturient women. Women should not avoid epidural analgesia for fear of neonatal harm, breastfeeding difficulties, Caesarean delivery, long-term back pain or long-term urinary incontinence.

Research: The authors state that appropriately designed, randomised and multidisciplinary studies relating to topics associated with epidural analgesia are needed. More research should be conducted, particularly to determine why some normothermic women shiver after receiving epidural analgesia.

**Bibliographic details**


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**Other publications of related interest**


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